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## EUROPEAN PATENT APPLICATION

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(54) Telephone terminal apparatus, radio communication terminal and information input method

(57) In a conventional terminal apparatus, there is a problem that the device become large because a button key such as ten-key is used as an input means. In a terminal apparatus having a display means used for displaying information and a memory means used for storing said information, an input means, having a specific

operation unit which is operable in both ways and in different two directions, for detecting the physical moving direction of the specific operation unit, and a control means for switching a letter or a symbol to be displayed on said display means based on the detected result of said input means in the letter input mode, or for determining the input, are provided.

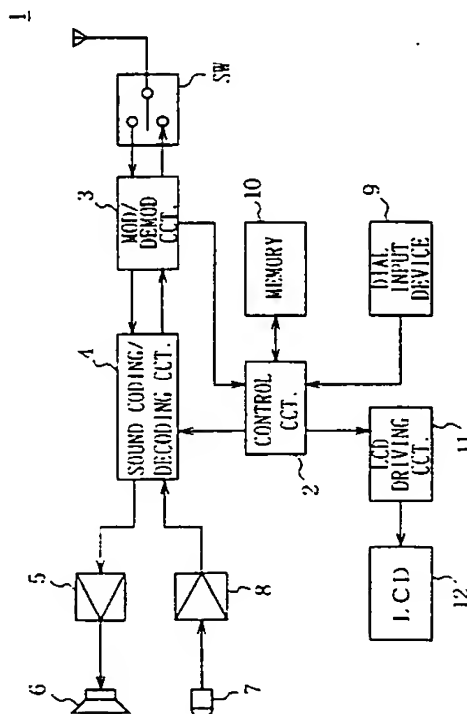


FIG. 1A

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## Description

The present invention relates to a terminal apparatus, a radio communication terminal, and an information input method, and more particularly, is applicable to a portable telephone.

Nowadays, some portable telephones are provided with a function that is able to call directly to the other party from the display of a telephone book list in which telephone numbers and names of other parties have been registered, namely, a telephone book list function. Generally, an input device such as ten-key has been used for registration to this telephone book list.

However, miniaturisation and weight reduction of portable telephones means that they are running short of even space for mounting an input device such as ten key. Therefore, it is required to realize an input device which can manage with less mounting space.

In view of the foregoing, an object of this invention is to provide a terminal apparatus having an input device which can manage with less mounting space than that of a conventional one.

Another object of the invention is to provide a radio communication terminal and an information input method.

The foregoing object and other objects of the invention have been achieved by the provision of a terminal apparatus comprising: an operation means being operable nearly to parallel direction to a surface plane of a body and nearly to perpendicular direction to a surface plane of a body; a control means for processing an information entered by the operation means; and a display means for displaying information processed by the control means.

Further, this invention provides a radio communication terminal comprising: an antenna for emitting and gathering radio wave; a transmitting means for transmitting; a receiving means for receiving; an operation means being operable nearly to parallel direction to a surface plane of a body and nearly to perpendicular direction to a surface plane of a body; a control means for processing an information entered by the operation means; and a display means for displaying information processed by the control means.

Further, this invention provides an information input method with plural modes comprising the steps of: a first step for showing a candidate character to input forward to the character being shown at present; a second step for showing a candidate character to input backward to the character being shown at present; a third step for changing input mode, and a fourth step for confirming entered character.

The invention will be further described by way of non-limitative example, with reference to the accompanying drawings in which like parts are designated by like reference numerals or characters, and in which:-

Figs. 1A and 1B are a block diagram and a whole

view showing an example of a terminal apparatus according to the present invention;

Fig. 2 is a schematic diagram explaining a dial input device;

Fig. 3 is a schematic diagram showing the summary structure of the dial input device;

Fig. 4 is a flow chart showing the control procedure of a control circuit executed in a user input mode;

Fig. 5 is a schematic diagram showing an example of a display screen;

Fig. 6 is a schematic diagram showing an example of a display screen to be displayed when an inputted character is determined;

Fig. 7 is a schematic diagram showing an example of a display screen to be displayed when an input mode is switched;

Figs. 8A and 8B are schematic diagrams showing examples of a display screen to be displayed when the already determined character is corrected; and

Figs. 9A and 9B are schematic diagrams showing examples of a display screen to be displayed when the input mode is ended.

Preferred embodiments of this invention will be described with reference to the accompanying drawings:

### (1) General Construction

Fig. 1A shows a portable telephone 1 as an example of a terminal apparatus according to the invention. The portable telephone 1 shown in this embodiment is characterized in using a dial input device as an input device. First, the general construction of the portable telephone 1 will be described. The portable telephone 1 is constructed so that a control circuit 2 is in the centre. The control circuit 2 has a microprocessor structure and controls internal devices such as a modulating/demodulating circuit 3 and a sound coding/decoding circuit 4.

When receiving signals, the modulating/demodulating circuit 3 operates to input a signal of the radio frequency band which has been received by an antenna via a switch SW, and output the demodulated signal to the sound coding/decoding circuit 4. At this time, the sound coding/decoding circuit 4 decodes the demodulated signal into a sound signal and outputs it to a speaker 6 via an amplifier 5.

When transmitting signals, the sound coding/decoding circuit 4 operates to code the sound signal which has been inputted via a microphone 7 and an amplifier

8, and output it to the modulating/demodulating circuit 3. At this time, the modulating/demodulating circuit 3 modulates the inputted sound signal into a signal of the radio frequency band and transmits it via the switch SW and the antenna.

Note that, in the portable telephone 1, an electronic mail function to transmit and receive comparatively short sentences is provided in addition to a function to register telephone numbers and names of other parties in the telephone book. A dial input device 9 is used to input letters and numerals on executing these functions. Fig. 1B shows a rough sketch of the whole configuration of the portable telephone 1.

The dial input device 9 is an input device that allows the rotational upward and downward turning operation and push operation in the horizontal direction.

A user can change an alphabet displayed on a screen by turning the dial input device 9 upward and downward, and also can determine the input of alphabet displayed on the screen by pushing the dial input device 9 in the horizontal direction. In this connection, the user can change an operation mode of the portable telephone 1 by pushing the dial input device 9 for a long time.

A memory 10 stores the data of letters or the like, which has been inputted by means of the dial input device 9 as the above manner. The memory 10 also stores such as a control program and management data other than the letter inputted by the user.

The data stored in the memory 10 is read out at a suitable time by the control circuit 2 and displayed on the screen of a LCD device 12 via an LCD driving circuit 11. Note that, in the user input mode, alphabets "A, B, C, ... Z" and "a, b, c, ... z" are displayed in this order, and moreover, symbols representing "return to the preceding letter" and "end of inputting" are displayed following these alphabets.

## (2) Structure of Dial Input Device

Fig. 3 shows the detailed structure of the dial input device 9. The dial input device 9 is composed of a rotary encoder 9A and a switch SW. Here, the rotary encoder 9A has the structure that two discs of which surfaces are formed with electrode patterns facing to each other are attached to a slide board 9B, and that the rotary encoder 9A rotates freely. Further, the slide board 9B is pushed out toward the outside which is shown by an arrow "c" owing to the force of a spring so that the slide board 9B slides into the body to close the electrode of the switch SW only when the user pushes the dial input device 9 in the radial direction.

In this connection, the rotary encoder 9A is used to detect the turned direction and the amount of turning of the dial, and the switch SW is used to detect the dial push in the horizontal direction.

In case of this embodiment, in a letter input mode, if the dial input device 9 is turned upward in this figure,

the control circuit 2 changes the order of alphabet to be displayed at the cursor position of the LCD device 12 to the alphabetical order, on the contrary, if the dial input device 9 is turned downward in this figure, the control circuit 2 changes the order of alphabet to be displayed at the cursor position of the LCD device 12 to the inverse alphabetical order.

Also, in the embodiment, if the dial input device 9 is pushed for a short time only once (namely, clicking), the control circuit 2 determines the inputted letter displayed on the LCD device 12. In this connection, when the letter inputted by this clicking operation is a symbol representing "return to the preceding letter", the control circuit 2 directs the LCD driving circuit 11 to return the cursor position displayed on the LCD device 12 to the position of one preceding letter. By this operation, the user can correct the inputted letter and can input a sequence of letters such as message and name.

Further, when a symbol representing "end of inputting" is inputted by the clicking operation, the control circuit 2 terminates the user input mode and proceeds to a mode selecting display.

On the other hand, when the dial input device 9 has been pushed for a long time (namely, hold), the control circuit 2 judges that change of the operation mode is directed.

For example, if the user pushes the dial input device 9 for a long time in the letter input mode, an alphabet at the cursor position to be displayed on the screen is changed from a capital letter to a small letter or from a small letter to a capital letter.

## (3) Judging Procedure of Control Circuit in the User Input Mode

Fig. 4 shows the judging procedure of the control circuit 2 in the user input mode. If the user input mode is selected on the screen of the LCD device 12, the control circuit 2 starts the processing from step SP1 and then proceeds to step SP2 to set the user input mode as an operation mode.

The control circuit 2 proceeds to step SP3 in this state to judge whether or not the operation which has been done with respect to the dial input device 9 is a turning operation in the upward direction ("up" operation), based on the output signals of the rotary encoder 9A and the switch SW.

Here if an affirmative result is obtained, the control circuit 2 proceeds to the processing of step SP4 to direct that the next character in regular order is displayed as a character to be displayed at the cursor position, and then returns to step SP3. At this time, if the operation mode is an alphabet input mode, A, B, C, ... are sequentially displayed as characters, on the other hand, if it is a telephone number input mode, 1, 2, 3, ... are sequentially displayed as characters.

On the contrary, if a negative result is obtained at step SP3, the control circuit 2 proceeds to the process-

ing of step SP5 to judge whether or not the operation which has been done with respect to the dial input device 9 is a downward turning operation ("down" operation).

Here, if an affirmative result is obtained, the control circuit 2 proceeds to the processing of step SP6 to direct that the preceding character in regular order is displayed as a character to be displayed at the cursor position, and then returns to the processing of step SP3. At this time, if the operation mode is the alphabet input mode, Z, Y, X, ... are sequentially displayed as characters, on the other hand, if it is the telephone number input mode, 0, 9, 8, ... are sequentially displayed as characters.

If a negative result is also obtained at step SP5, the control circuit 2 proceeds to the processing of step SP7 to judge whether or not the operation which has been done with respect to the dial input device 9 is the operation of pushing for a long time in the horizontal direction (namely, "hold" operation).

Here, if an affirmative result is obtained, the processing proceeds to step SP8 to direct the control circuit 2 to change the input mode, and returns to step SP3. By this processing, the input mode of a letter to be inputted next is changed from the capital letter mode to the small letter mode.

Further, if a negative result is obtained at step SP7, the processing proceeds to step SP7.1 where it is judged whether or not the click is inputted. If a negative result is obtained at step SP7.1, it is judged that there is not any input, and the processing returns to step SP3. If an affirmative result is obtained at step SP7.1, the processing proceeds to step SP8.1 where the content of inputted information is confirmed, and then proceeds to step SP7.2. If the content of information is a normal character (a capital or small alphabet, or numeral), the processing proceeds to step SP8.2 where the cursor is moved to the next position, and then returns to step SP3. If a negative result is obtained at step SP7.2, the processing proceeds to step SP7.3. If the content of information is "the symbol of returning to a preceding position" described later, the processing proceeds to step SP8.3, and if not, the cursor is returned to one preceding position and the processing returns to step SP3. If a negative result is obtained at step SP7.3, the processing proceeds to step SP7.4. If the content of information is not "a symbol of end input", the processing returns to step SP3 to check the input again because this case is impossible in normal case and there is a possibility of malfunction due to noise, etc. If an affirmative result is obtained at step SP7.4, the processing proceeds to step SP9 to terminate the input mode and proceeds to step SP11. In this way, the operation of inputting by user is performed.

#### (4) Example of Input Operation

On the above structure, an example of an alphabetically inputting will be described.

For example, if the user would like to display "D" as a letter following these three letters "ABC" which has been inputted already, as shown in Fig. 5, the user turns the dial input device 9 toward the upward direction so that an alphabet displayed at the position of a cursor K is sequentially switched to "A" - "B" - "C" to display the letter "D" as a candidate character to be inputted. At this time, "D" which is not determined yet by clicking the dial input device 9 is in a blinking state.

Here, if the user determines inputting by pushing the dial input device 9 in the horizontal direction for a short time (namely, clicking), the display screen of the LCD device 12 is switched from Fig. 6A to Fig. 6B and the cursor K is moved to the next position.

At this time, if the user would like to input the small letter "d" not the capital letter "D", the user changes the input mode by pushing the dial input device 9 for a long time (namely, holding).

Thereby, the letter displayed in a blinking state at the position of the cursor K is changed from the capital letter "D" shown in Fig. 7A to the small letter "d" shown in Fig. 7B. Thereafter, if the user would like to determine inputting in a small letter, the user clicks the dial input device 9, on the contrary, if the user would like to determine inputting in a capital letter, the user holds the dial input device 9 again.

In the case where the user would like to input again in the state where the large letter "D" has been inputted, the user turns the dial input device 9 upward or downward to display a symbol representing "return to the preceding letter" at the position of the cursor K.

In case of this embodiment, the symbol representing "return to the preceding letter" has been prepared at the position after "Z", and so the user changes the inputting by turning the dial input device 9 until this symbol is displayed. The state where the symbol representing "return to the preceding letter" is displayed is shown in Fig. 8A. At this time, if the user clicks the dial input device 9, the position of the cursor K moves to the position of "D" which has been determined inputting, as shown in Fig. 8B.

If the user would like to end the user input mode in the state where the inputting of "ABCDE" has been determined by repeating the above operation, the user changes a character to be displayed at the position of the cursor K to a symbol representing "end inputting" by turning the dial input device 9 upward or downward, as shown in Fig. 9A.

In this situation, if the user clicks the dial input device 9, the screen changes into an input end screen.

According to the above structure, it is able to realize a portable telephone in which the user can input a necessary character only by turning upward or downward or pushing the dial input device 9. Thereby, a portable telephone 1 with a small body and without input unit such as a ten-key can be realized.

Furthermore, in case of using this dial input device 9, the user's usability can be improved because it is able

to operate with one finger while holding the body with one hand.

#### (5) Other Embodiments

In the aforementioned embodiment, it has been described in the case where an alphabet is inputted with the dial input device 9 in the user input mode, however, the present invention is not limited to this, but it is applicable to the case of inputting the other characters such as a numeral, inputting a virtual name, and inputting a character such as French or German.

Also, in the aforementioned embodiments, it has been described in the case where if the change of the input mode are directed in the user input mode, the input of capital letters and small letters are changed, however, the present invention is not limited to this, but it is widely applicable to the case of changing a group of characters.

For example, it is also able to be used in changing the displayed group of English letters to French letters, to German letters, and to others.

Further, in the aforementioned embodiments, it has been described in the case where the dial input device is used as a means for inputting a characteristic sequence in the user input mode, however, the invention is not only limited to this, but may use the other equipment, which is an input device capable of selecting and determining a candidate.

For example, the present invention is also applicable to an input device of other system having an operating unit which is able to use in both of turning operation and pushing operation. For example, the input device provided with a mechanism in which the operating unit always returns to the neutral position when the user let go his hand from the operating unit can be used.

Furthermore, in the aforementioned embodiments, it has been described in the case where a symbol of "return to the preceding character" shown in Figs. 8A and 8B is used and a symbol of "end inputting" shown in Figs. 9A and 9B is used, however, the invention is not only limited to this, but can use the other shapes of symbols.

Also, in the aforementioned embodiments, it has been described about an LCD device as a display means, however, the invention is not limited to this, but can use the other display means.

Furthermore, in the aforementioned embodiments, it has been described about a portable telephone as an example of a terminal apparatus, however, the present invention is not limited to this, but is also applicable to a communication terminal apparatus such as a portable information terminal (personal digital assist) for transmitting and receiving text data, a wired terminal apparatus, or the like.

As described above, according to the present invention, an input means having a specified operation unit which is operable in both ways and in two different operational directions, is used to input a letter or a sym-

bol, so that a terminal apparatus in which the mounting space of an inputting means become extremely small can be realized.

While there has been described in connection with the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made within the scope of the invention as defined by the appended claims.

#### Claims

##### 1. A terminal apparatus comprising

operation means (9) movable relative to said apparatus to enter information;

a control means (2) for processing an information entered by said operation means (9); and

a display means (12) for displaying information processed by said control means characterised in that said operation means (9) is operable in a direction substantially parallel to a surface plane of a body and in a direction substantially perpendicular to a surface plane of a body.

##### 2. The terminal apparatus according to claim 1, wherein said operation means (9) comprises dial operation means (9A,9B).

##### 3. The terminal apparatus according to claim 2, wherein said dial operation means (9A,9B) comprises:

a rotary encoder (9A) for said operation in said substantially parallel direction; and

a switch (9B) for said operation in said substantially perpendicular direction.

##### 4. The terminal apparatus according to claim 2, wherein said dial operation means (9A,9B) comprises:

an input means (9A) urged to a default position for said operation in said substantially parallel direction; and

a switch (9B) for said operation in said substantially perpendicular direction.

##### 5. The terminal apparatus according to claim 1, 2, 3 or 4, wherein said control means (2) recognizes operation of said operation means (9) in directions to and fro in said substantially parallel direction in said substantially perpendicular direction.

6. The terminal apparatus according to claim 5, wherein said operation to and fro corresponds to movement forwards or backwards in predetermined order through a predetermined group of data.

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7. The terminal apparatus according to claim 6, wherein said predetermined order is an alphabetical order.

8. The terminal apparatus according to claim 5, 6 or 7, wherein said control means (2) distinguishes short duration and long duration pushes of said operation means (9) in said substantially perpendicular direction.

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9. The terminal apparatus according to claim 8, wherein: one of said short duration push and said long duration push corresponds to an enter operation; and

the other of said short duration push and said long duration term push corresponds to a changing mode operation.

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10. The terminal apparatus according to claim 9, wherein said changing mode operation corresponds to changing capital letters to small letters and vice versa.

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11. The terminal apparatus according to claim 9, wherein said changing mode operation corresponds to changing languages.

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12. A radio communication terminal comprising: an antenna for emitting and gathering radio waves; a transmitting means (3) for transmitting radio waves; a receiving means (3) for receiving radio waves; and a terminal apparatus according to any one of the preceding claims.

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13. An information input method with plural modes comprising the steps of:

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a first step for showing a candidate character to input in front of the character being shown at present;

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a second step for showing a candidate character to input behind the character being shown at present;

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a third step for changing input mode; and

a fourth step for confirming entered character.

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14. The information input method with plural modes according to claim 13, wherein:

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one of said first, second, third, or fourth step is

executed in response to an operation of an operation member (9) in a direction substantially parallel to a surface plane of a body;

another one of said first, second, third, or fourth steps is executed in response to an operation of said operation member (9) in a return direction substantially parallel to the surface plane of the body;

another one of said first, second, third, or fourth steps is executed in response to a short duration push of said operation member (9) in a direction substantially perpendicular to the surface plane of the body; and

another one of said first, second, third, or fourth steps is executed in response to a long duration push of said operation member (9) in a direction substantially perpendicular to the surface plane of the body.

15. The information input method with plural modes according to claim 14, further comprising the steps of:

if a content of entered datum is a back-space code, then performing back-space operation after said first, second, third, and fourth steps are executed; and

if a content of entered datum is an input-end code, then performing input-end operation after said first, second, third, and fourth steps are executed.

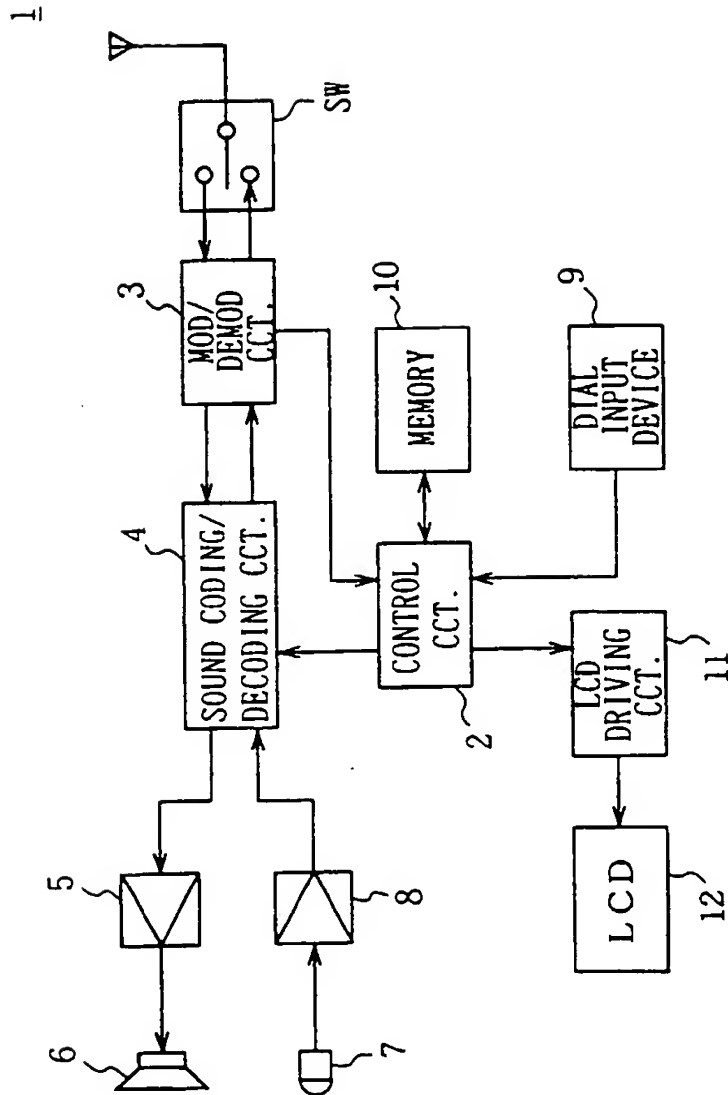


FIG. 1 A

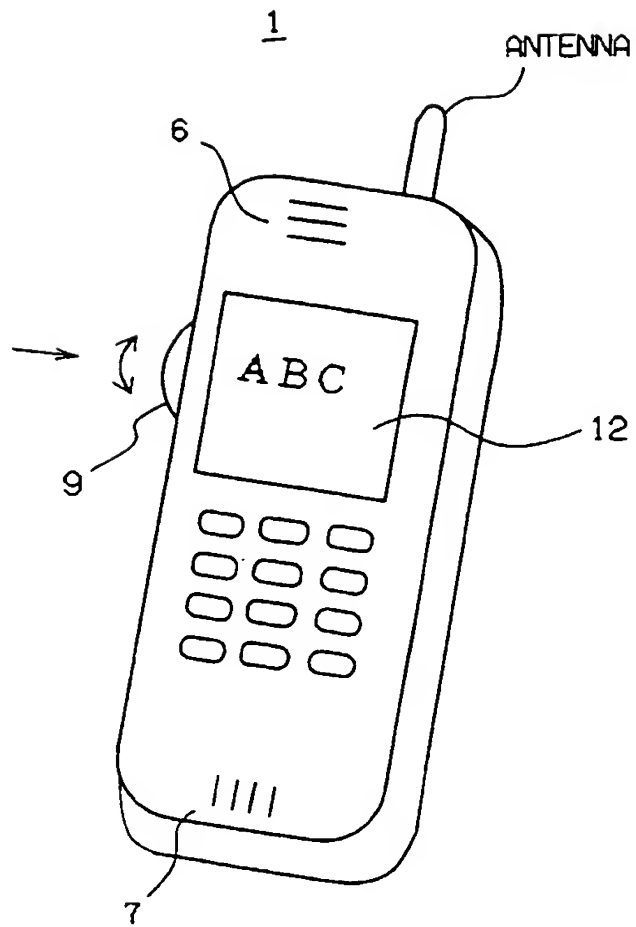


FIG. 1 B



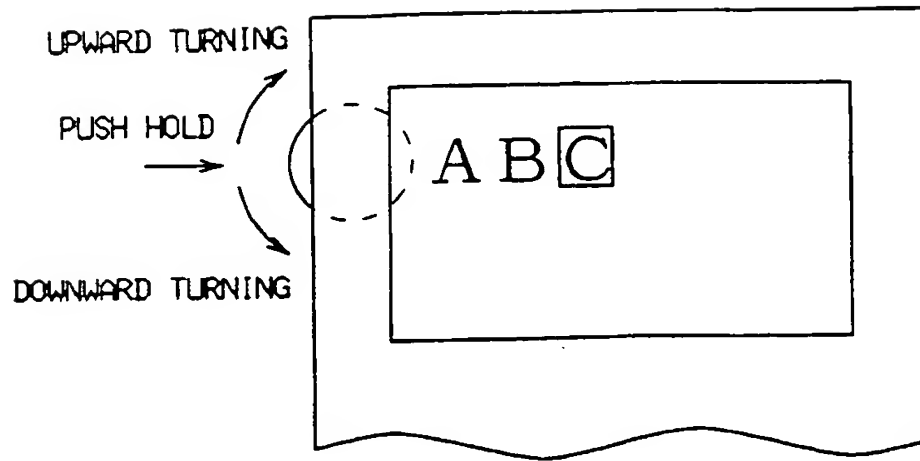


FIG. 2

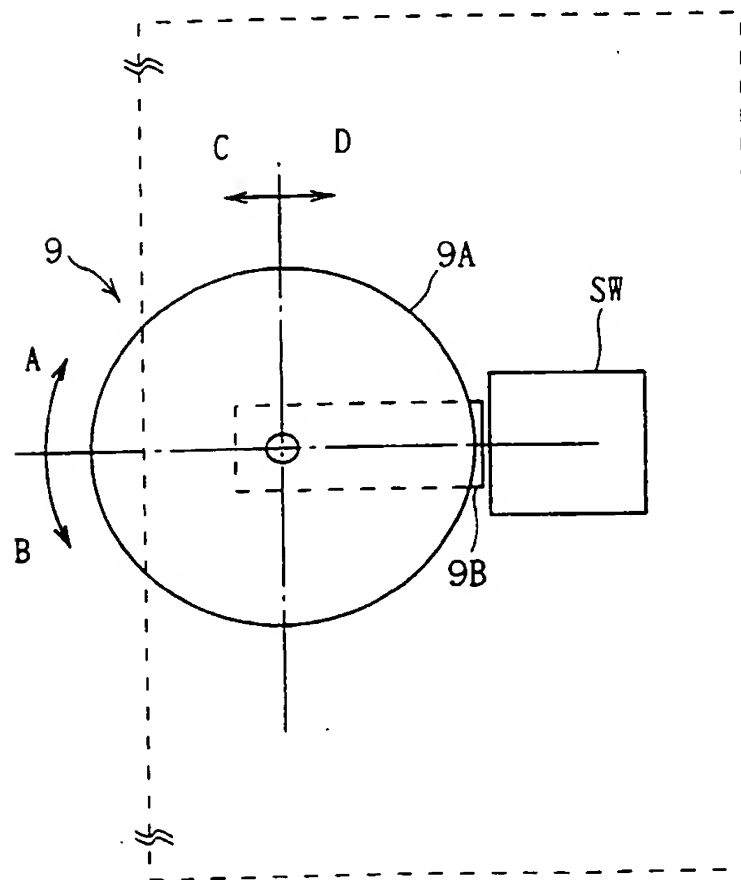


FIG. 3

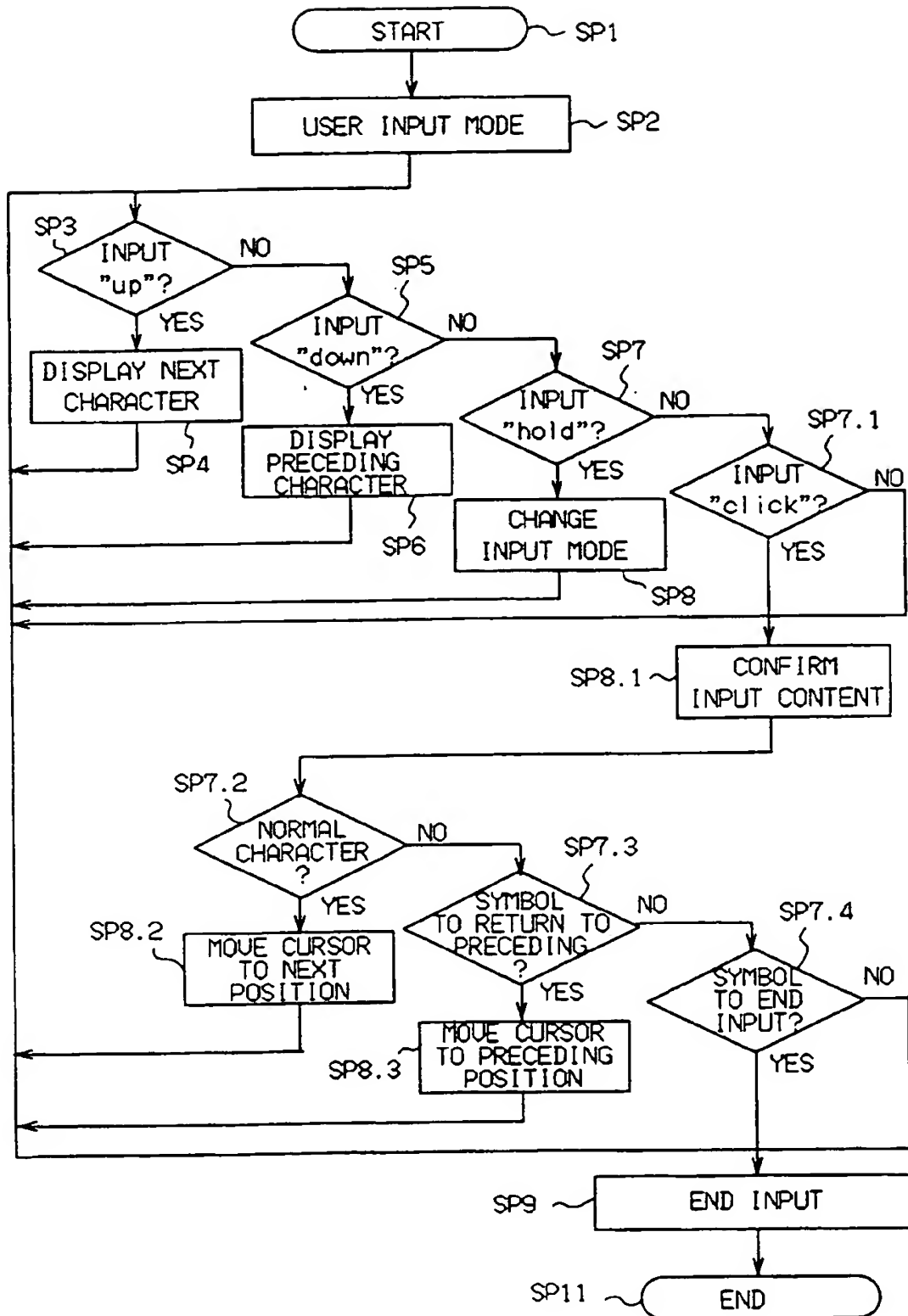


FIG. 4

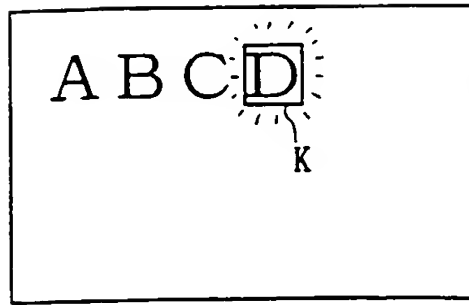


FIG. 5

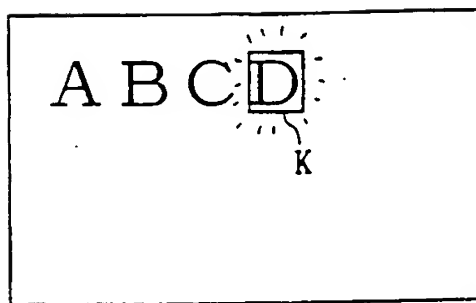


FIG. 6 A

CLICK  
→

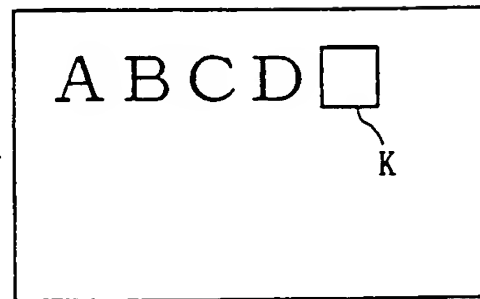


FIG. 6 B

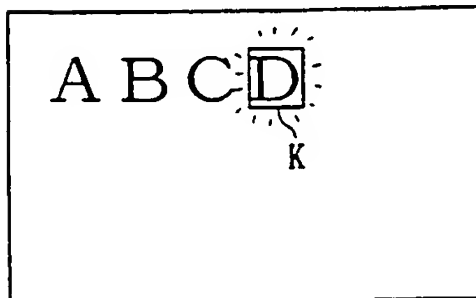


FIG. 7 A

HOLD  
→

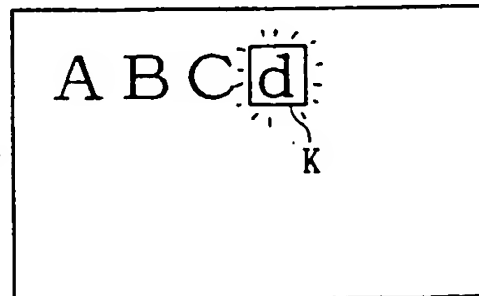
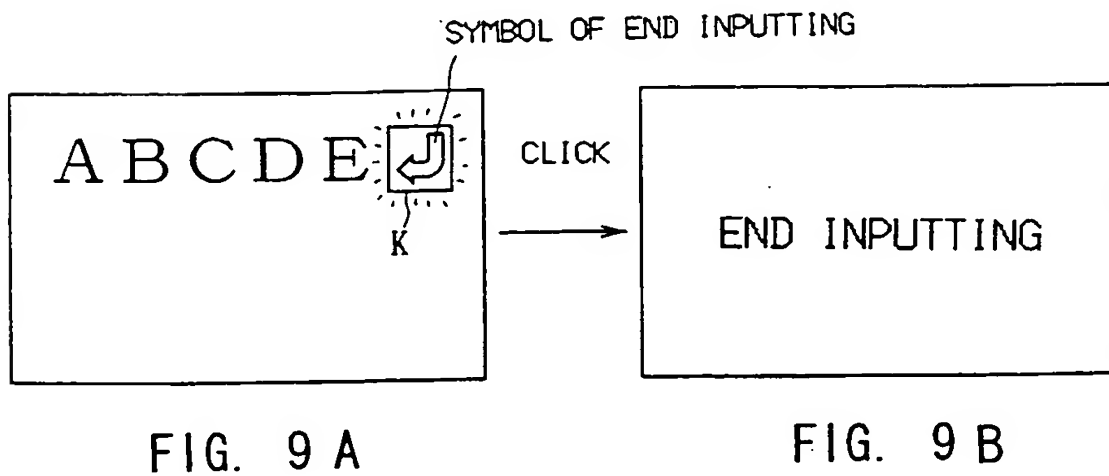
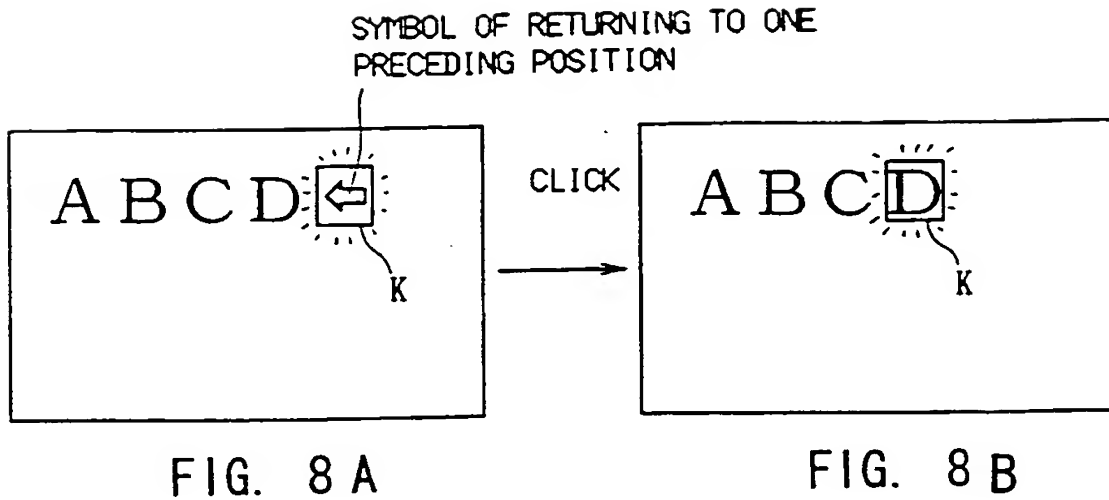


FIG. 7 B



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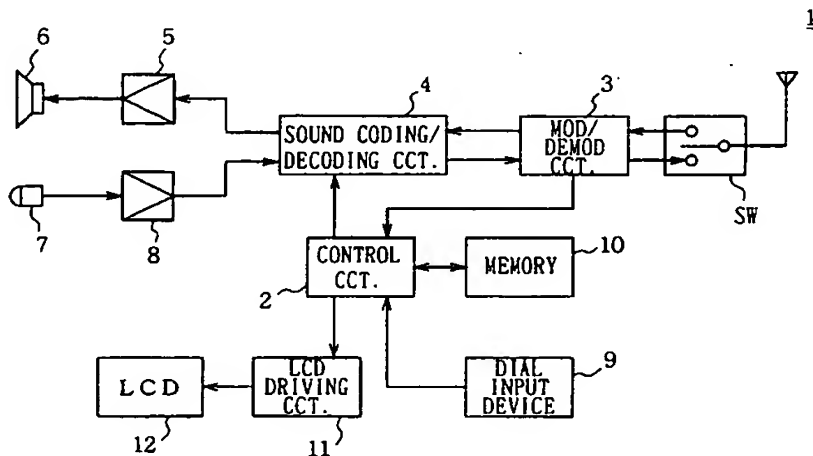
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operation unit which is operable in both ways and in different two directions, for detecting the physical moving direction of the specific operation unit, and a control means for switching a letter or a symbol to be displayed on said display means based on the detected result of said input means in the letter input mode, or for determining the input, are provided.

**FIG. 1 A**



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 96 30 5284

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	EP 0 588 210 A (HITACHI LTD) 23 March 1994 * column 3, line 49 - column 11, line 46; figures 1-9 *	1-6,12 13-15	H04M1/274 H04M1/72
X A	WO 93 14589 A (MOTOROLA INC) 22 July 1993 * page 3, line 30 - page 13, line 35; figures 1-6 *	13 1-6,8,9, 12,14	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H04M
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>26 May 1999</b>	Examiner <b>Delangue, P</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 92 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 96 30 5284

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The members are as contained in the European Patent Office EDP file on  
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26-05-1999

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